Natural Coordination System (NCS) and existing theories in Physics and Cosmology.

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After the introduction of Natural Coordination System (NCS) by our last contribution[1] (Has the time come?) in this contest we shall put forward some ideas that we think clarify in the simplest way a few physical and cosmological mysteries or controversial theories that are part of the established science nowadays.

For simplicity reason the whole assay is referring to a 2+1 dimensional world, keeping in mind that NCS for this dimensionality has 2 real axes (X,Y)and 1 virtual axis (Φ) in RCS (Real Coordination System) and 2 virtual axes (Φ_X,Φ_Y)and 1 real axis (R) in VCS (Virtual Coordination System). The actual 3+1 dimensional world is treated accordingly without any major difficulty apart from our envision and figuration.

We should recollect that NCS is based on space as well as time granulation and that the whole is consisted by the RCS (dealing with space and real measurements) and the VCS (dealing with unmeasurable entities that consist the cause and appearance of any interaction).

1. Quantum spacetime and expanding Universe.

According to NCS there is no difference among the three axes of RCS or the three axes of VCS as they are symmetric in any respect. However, we can conceive only two axes (X,Y) in RCS or can get a sense of two axes (Φ_X,Φ_Y) in VCS.
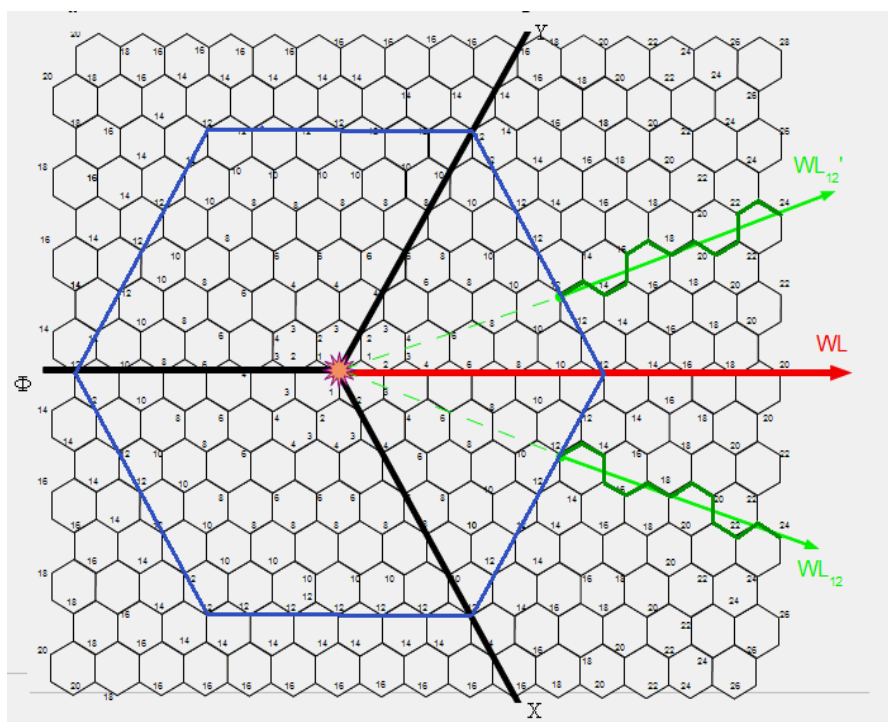

FIGURE 1

In figure 1 it is shown the granulation (quantization) of spacetime in RCS at the very proximity of Big Bang (BB, singularity). Each vertex of the graph represents a unique "event" in spacetime and is characterized by its "Cosmic Age" (CA), a

number that shows its "distance" in discrete steps (Plank lengths) from BB. We could consider as a general physical law that the entity of each vertex with the progress of time occupies a new vertex of higher CA and specially its CA increases one unit per Plank time ($5.4*10^{-44}$sec). The red line (fig. 1) represents the world line (WL) of the referee observer according to whom the Universe is examined. Hence any event on WL, or in its proximity within one Plank length ($1.6*10^{-35}$m), will "move" outward following the red WL (e.g. from CA12 to CA13, CA14, ...). In this case the event is said to be "at rest" referential to itself. Two events that are "at rest" referential to themselves will be relative moving (because their WLs will continuously move apart). This is shown in fig. 1 by event 12 tracing on WL (red) and event 12 tracing on WL_{12} (green), or on discrete points (dark green line). It is worth to mention that events with the same CAs are part of the Universe with this cosmic age. In our example of figure 1, the Universe of CA 12 (Plank time units) is consisted by all the events with CA 12, all simultaneous and on the periphery of a regular hexagon (green). If we want to examine the system of the two observers at rest but having the observer on WL_{12} as the referee one we have to consider its RCS, so the observer of WL_{12} will take the position 12 on WL and our previously referee observer will take the position 12 on WL_{12}' (green). The trajectory of referee observer is always on WL (red) while the observers' trajectories we examine are on the proximity of WL_{12} or on the proximity of WL_{12}' (both dark green).
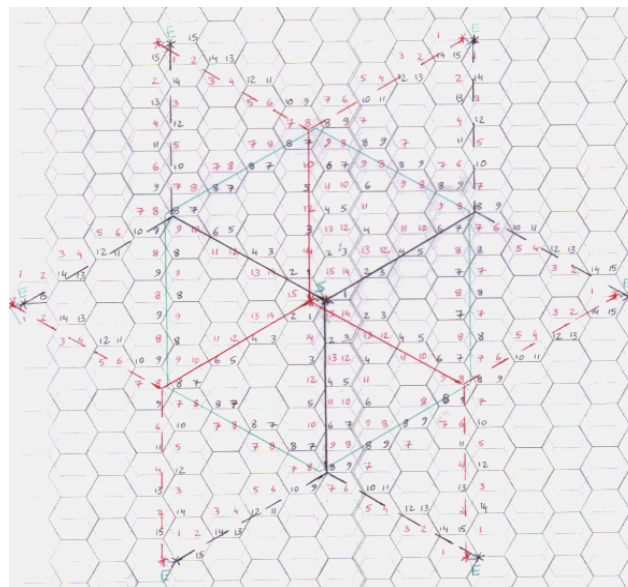

FIGURE 2

In fig. 2 a tiny Universe of overall cosmic age 16 is shown (VCS is included). In this case the BB is point S (green) and its End E (after its shrinkage). Point E is the one and single point that all the axes converges. It should notice that S is at the middle between real and virtual origins. Green hexagon is the edge between real (inside) and virtual (outside) cosmic ages. The "infinity" in this Universe is 16, so infinity/2 is 8 (hexagon). In order to imagine the Universe as a "spherical" surface we have to deform (stretch) the quantum hexagons accordingly keeping the metric and orientation of axes unchanged.

If we examine fig. 2 in more detail (fig. 3) we will see that a real event moving on its WL (green) in RCS meets real points that have only even CAs (2,4,...) and in between it meets virtual points (I-1, I-3, ...) that correspond to the virtual

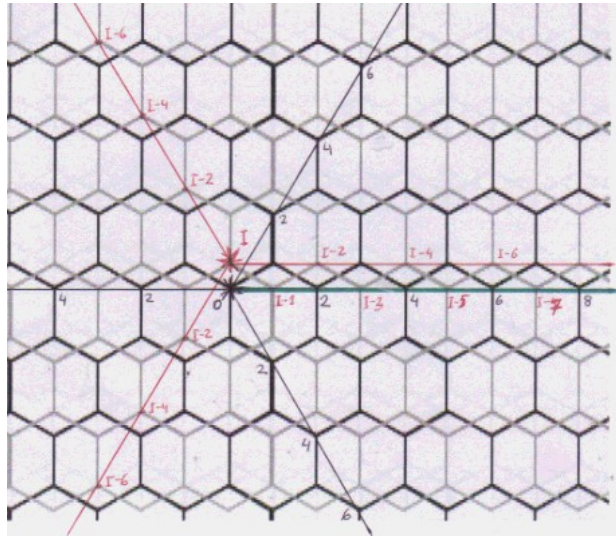coordinations (in VCS) of its actual virtual complementary event.

FIGURE 3

Hence, during our real trajectory we jump from real-(reality) RCS to virtual-(reality) VCS, "missing" half of our real points (the odd ones).
In our case (e.g. earth) that CAs are huge (approx. $4*10^{60}$ Plank time units) the WLs of all events in our proximity (see WL_1,WL_2, …) are practically parallel to our own (WL) that is the referee one and the relative motion due to space expansion is undetectable (fig. 4). The numbers shown in fig. 4 are arbitrary and a number like $4*10^{60}$ should be added to each of them.
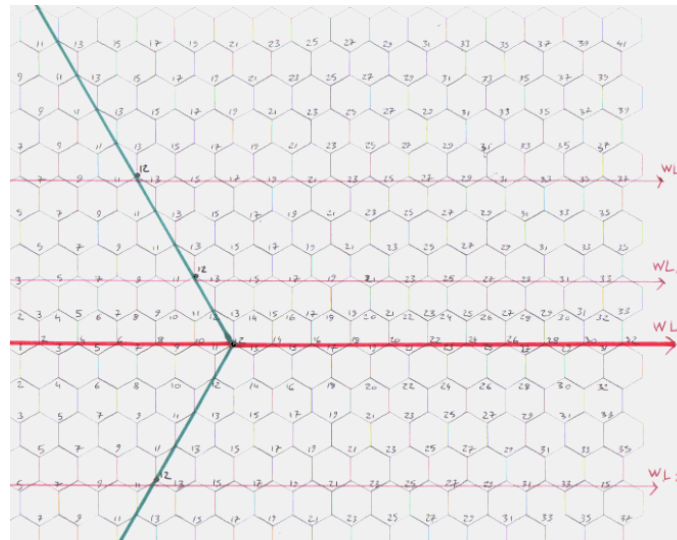

FIGURE 4

2. Special Relativity and Time dilation.
Motion in NCS is more complicated than in Cartesian system because we can not exclude spacetime expansion as it is part of the system (NCS) itself. However, problems or paradoxes that are painful in Cartesian system seem resolved in NCS.
We have seen already in fig. 1 how two events at cosmic rest, referential to an observer (on the red WL), are seen by him. If we examine the same system with the eyes of an observer that rests on WL_{12} we have to set his own NCS according

to which he will be on WL and our previously referee observer will "move" on the WL'_{12} (fig. 1).

Simultaneous events in NCS are the ones with the same CA. All simultaneous events are on the edges of a hexagon and the referee observer (RO) is always on one of its corners. In other words RO's distance from the origin is the maximum. If we consider this distance as "time" it is obvious that we drive ourselves into troubles as any move away from RO seems to be connected with "time dilation" (decrease of its distance from the origin).

Twin paradox is based on time dilation. For example if RO and a moving observer are close with approximately the same distance ("time") from origin (Big Bang, BB) after a while moving observer will have distance T_m equal to $T+\Delta T_m$ ($\Delta T_m<\Delta T_r$) while RO's $T_r=T+\Delta T_r$. When moving observer decides to return he will move backwards and after a while he will have also the same time dilation according to his referee system. The misconception in this experiment is that we changed the referee coordination system in the middle of the experiment without changing the position of starting RO to the new system. His position (distance) from the origin should be corrected by subtraction twice the time dilation of outgoing travel because the RO's advantage in distance has become disadvantage by interchanging the two observers and hence the system of reference. As a result the overall distance (from the origin) of the two observers will be the same when they will be close in spacetime again.

We have "time dilation" for outgoing observers (events) and "time extension" when they approach each other. The concept of time dilation has no physical meaning so far as the distance from the origin does not represent time. Note in fig. 5 the distance difference (time dilation) of simultaneous events E_r4, E_1in4, E_14, E_1out4 from the circle with radius 4. The final time dilation between two events has not to do with the relative velocity between the two events but the angular distance between them (although the later is related to their relative velocity).

3. Light, light cone and movement.

So far we supposed that spacetime is expanding with a constant rate. This means that if it takes time T to get CA=A it takes double this time to get CA=2*A. However, it is experimentally found (and it is logical too) that the rate of Universe's expansion is increasing with time. In other words, time needed to cover the same CA difference is gradually decreased down to a limit at real Universe's edge. As soon as Universe enters into its virtual reality (fig. 2, outside the green hexagon) the rate of Universe expansion is gradually decreased down to zero at point E.

The rate of real Universe expansion is analog to CA. We have stated in our previous correspondence[1] that light's speed is proportional to the distance from the origin as well.

Light is traveling on $120°$ angle to present time's WL with velocity (speed) double the velocity, due to expansion, of any massive particle. Light's trajectory follows an equiangular outward spiral of the form $r=ab^\theta$ (a: constant, $\log(b)=-3*\log(2)/\pi$, r: the distance from the origin in spacetime, θ: angular distance origin "sees" between emitter and receiver, $\theta<0$ referential to emitter and $\theta>0$ referential to receiver).
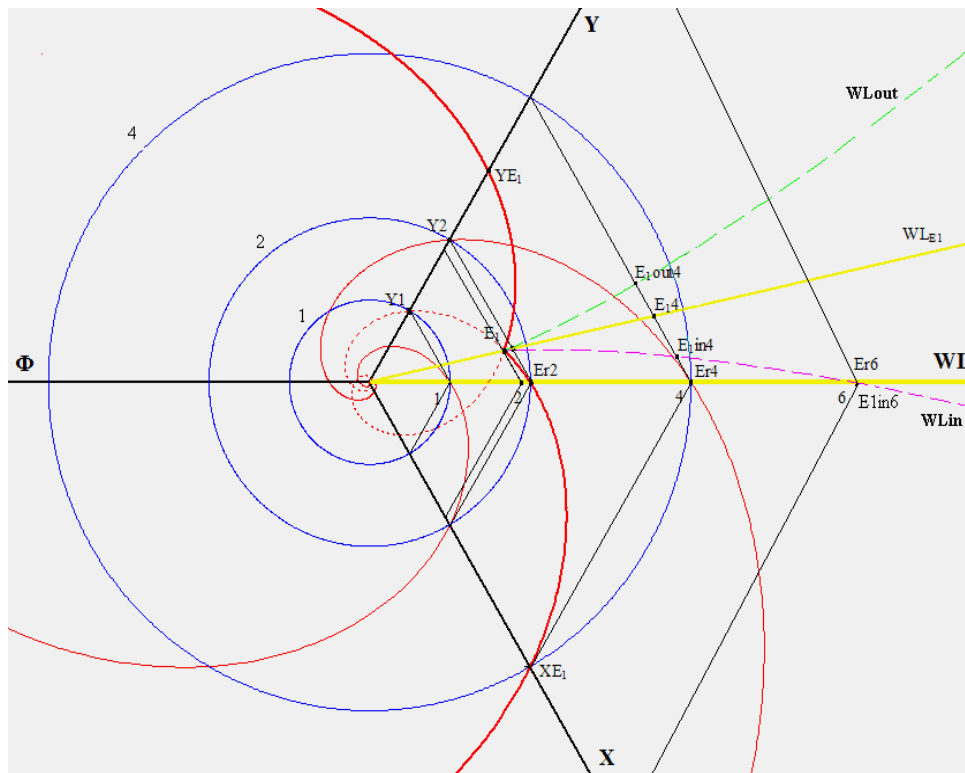
FIGURE 5

In figure 5 we suppose we are the referee observer and so we are always on our WL (yellow) at different times (e.g. E_r2-time 2, E_r4-time 4, E_r6-time 6). Let us suppose that an observer (E_1, event in spacedtime) emits a photon at time approx. 1.725 (arbitrary value) towards our observer (E_r). This photon will reach E_r at time 2 (E_r2). If E_r did not absorb it, photon will continue its trajectory until it exits from E_r's real world at XE_1 (on X axes). If object E_1 emits a photon towards the opposite direction this will not be detected by our observer (E_r) within its reality as photon will exit E_r's reality at point YE1.

Thus "light cone" of object E_1 will be the area within edges: axis X, light trace E_1-X_E1, light trace E_1-Y_E1, axis Y and up to time Infinity/2 where Universe will turn to virtual reality. Within this area (light cone) object E_1 a) can move, b) can have real attachment (its world line WL_{E1} can be related to observer E_r) or c) electromagnetic radiation from it (E_1) can have any real effect to other objects. If E_1 is moving with a constant velocity towards observer E_r its trace will be for example the magenta dashed line and it will "meet" E_r at approx. time 6. At time 4 observer E_r will be at point E_r4, object E_1 moving towards E_r will be at point E_1in4 or at point E_1out4 if E_1 is moving away E_r with the same constant velocity. It is obvious that according to NCS radiation (light) and object with mass are moving on a spiral trajectory of the form ab^θ, where: a is the radius of the event (the distance (time) from BB) at the instance of measurement (emission or absorption), b is the "velocity" of the event (is constant if velocity is constant) and θ is the variable that depends first on relative position (in spacetime) between the event and the referee observer (angular distance) and second on the time difference. θ is positive if we are dealing with observer's past (absorption) and θ is negative if we are dealing with observer's future (emission).

Galaxy's spiral form seems to be related to the spiral motion of its stars.

If we examine the quantized movement in the granular spacetime we find that during a two steps of time light entity moves two steps on "equispace route" (to

CA+2) and two steps on "equitime route".
Equispace route is the movement that a rest entity follows, the straight line (or its proximity) that starts from real origin and passes by the entity's vertex.
Equitime route is a movement that follows the edges of simultaneous hexagon, with CAs taking the values: CA or CA−1.
However, during a two time steps a massive entity moves two steps on equispace route and zero (rest) or up to two steps (light's speed) on equitime route.

4. Universe's Inflation, found Universe's age is half the actual one.
According to NCS and paragraph 3 we have stated that light's constant $b=10^{-(3*\log2)/п} = 0.515866741...$. This value of b is found by supposing that the radius of the referee observer at the point of photon's emission will be half the radius of the point that this photon will reach X (or Y) axis of RCS of the observer. This intimation is initially proposed based on number theory and it is not the proper place to try to persuade anyone on this.
It is evidence that no observer can "see" beyond X or Y axis as these are the edges of observer's real world. Because of light's b value, the time back any observer can "see" is only half his present cosmic time. Hence, an observer at time 13 billion years from BB could "see" only 6.5 billion years back. This proposition suggests that the "experimentally" found Universe's age (14 billion years) is actually half of the actual one (if we stay on assumption that the speed of light remains constant throughout Universe's life). The first half part (in time) of the Universe is unseen by any observer of present and it is the part that Inflation Theory has come to cover. It is not strange that according to this theory, in an astonishing short period of time so huge variations of Universe's size and composition have taken place with a "magic" way. Inflation is another misconception that science has to invent because of the unnaturalness of the Cartesian Coordination System we use.

5. Holography – coprime numbers, Black Hole information.
It is evident that every event (vertex) in the spacetime manifold is unique. By the term "unique" we mean that it can not reexist in another event (vertex) in universe's lifetime. If we want to have a coordination system (a referee system) that could be included in spacetime manifold and at the same time could represent each of its vertexes (events) we have to dust coprime theorem. In other words, if we have a coordination system and two straight lines that connect the system's origin with two different points then if these lines do not coincide then these two points are unique in this coordination system.
It is obvious that in a continuous spacetime there is no coordination system in which any two points are unique; because any straight line starting from the origin has infinite number of points, all members of the continuous spacetime. Hence, in order each point of a spacetime to be unique the spacetime has to be quantized. Even more in case our coordination system has only one origin, the start of its axes, the relation between points and axes has to be irrational. This makes our system extremely complicated. There is however an alternative, the use of two (or more) separate coordination subsystems, each one with its own origin and separate points in spacetime manifold. One of these systems is NCS according to which RCS (Real Coordination System) and VCS (Virtual Coordination System) are its two coordination subsystems with separate origins (black and red stars in fig. 2) and separate points (black and grey vertexes or

black and red CA numbers in fig. 2). The overall origin of NCS stays at the middle between the two separate origins in such a way that is not involved in any proportionality procedures among the points of spacetime and so we get uniqueness between any two points of spacetime. Even irrationality is unneeded under these circumstances.

The same principle - two separate referees - is used in holography (recall of a 3D picture from two 2D representations) or eye vision (two 2D eye views reconstruct a 3D view). Is our Universe really 3D or our two 2D eye pictures, absorbed in two different times, give us a 3D perception?

The way of how any information from inside a Black Hole (3D) can represented on its horizon (2D) is easily explicable as Black Hole is by itself a Universe with its own NCS accommodated into the major Universe's manifold and has its own origin that could radially project every point of its interior spacetime uniquely on its horizon.

6. Gravity.

Gravity is a subject that puzzles mankind throughout its short history. At last, we managed to invent the most puzzling (even more than the problem itself) theory (General Relativity) in order to "resolve" it. Unfortunately, only very few of us feel comfortable with it.

We could state that gravity as a typical interaction belongs to the virtual (sub)spacetime and that is why it is very challenging to be explained and hence always will be dark corners for its envision.

However according to the latest "scientific findings"[2] it seems that gravity is based on an extreme closeness (less than one Plank length) duality of gluon like the one included in NCS with RCS and VCS. In other words NCS' duality (or spacetime's duality) may be the "cause" of gravity as well.

Conclusion.

The time has come to see Nature in a new different way even if this elucidates we will never know its whole truth.

References.

(1)   http://www.fqxi.org/community/forum/topic/804

(2)   Scientific American, Vol 306, No. 5, p.20-27, May 1, 2012

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